

## **OpenVMS: When Continuous Availability Really Matters**

Compaq's OpenVMS and IBM's z/OS (formerly OS/390) are generally regarded in the industry to be the two "world class" operating systems. These are the operating systems to use for really critical business applications. Many of the applications in the banking, securities, healthcare, government, transportation and communications industries require both high scalability and extremely high application uptime. Application downtime requirements can range from almost zero to no more than 60 seconds. Online transaction performance requirements can be in the thousands per second. Disk storage requirements can be multiple terabytes.

OpenVMS, introduced in 1978, has 23 years of heritage in helping customers deploy high performance "business critical" applications and achieve a very competitive total cost of ownership. Compaq's pioneering OpenVMS Clusters, a key enabling technology for high scalability and availability, was introduced in 1983. Compaq has an installed base of approximately 450,000 OpenVMS customers. HRG estimates that there are over 50,000 OpenVMS Clusters deployed all over the world. Compaq believes that customers will spend \$4.1 Billion on OpenVMS systems, services, and applications in 2001.

However, the best news for Compaq is that *new* OpenVMS customers are now providing 20% of its OpenVMS-based systems' annual revenue. Compaq reports that total OpenVMS systems revenues actually grew by 4% from Q4 1999 to Q4 2000.

Harvard Research Group's June 2001 survey indicates that OpenVMS customers continue to be extremely loyal. The majority of customers have no plans to migrate away from OpenVMS. However, they want a lot more applications supported on OpenVMS. Compaq's decision to port OpenVMS to Intel's Itanium will provide customers with OpenVMS systems for the next 25 years and guarantee continued customer loyalty.

OpenVMS powers five of the world's top ten stock exchanges, 60% of the world's fund transfers, 50% of mobile phone billing systems and the world's largest online trading company.

*Compaq's OpenVMS platform is one with a rich history of successfully deploying high performance "business critical" systems. There is a large and loyal customer base. In June 2001, Harvard Research Group interviewed over 275 present users of OpenVMS to get a clear picture of perceptions in the marketplace. Users want to see a future for what they consider one of the most highly available and cost-effective servers on the market. Compaq's decision to port OpenVMS to Intel's Itanium family finally puts the issues surrounding Alpha's longevity, and the commitment to OpenVMS to bed.*

## **The Growing Customer Requirements for Highly Available Systems**

Customer need for deploying highly available systems that can scale is driven by the following trends:

- The highly interconnected global economy is now operating at lightning speed.
- There is an increased focus on world trade by most countries. Also there has been a significant decrease in trade barriers. This has opened up opportunities for industrial and financial services companies. The rapid growth of middle class consumers in countries like China and India is significantly increasing the demand for consumer goods and services.
- Many large corporations have product development centers in many countries.
- A substantial number of high technology components are now manufactured in Asia. Manufacturers in western countries are highly dependent on their plants and suppliers in Asia. This has fueled the demand for high availability IT infrastructure.
- Significantly improved voice and data communications during the last twenty years is enabling corporations to base many customer services in low cost “English speaking” countries to support customers in North America.
- The Global 2000 companies who operate in most countries of the world are relentlessly focused on increasing revenue and profit and obtaining dominant market share. They want to engineer, manufacture, sell, source and support all over the globe.
- The leading multinational companies see highly available and scalable systems as a necessity because their customers, employees, partners and suppliers are located in many different time zones. The “business critical” e-Commerce applications (ERP, CRM, SCM, Financial, Web, e-mail) must be up at all times. The time available for backup, maintenance and upgrades continues to shrink at a rapid rate.

HRG’s recently released High Availability Systems Forecast in August 2001 predicts that the market for systems that operate at Availability Level 3 (recovery in minutes, 99.99% uptime) and Availability Level 4 (no lost transactions, 99.999% to 100% uptime) will grow at a compound annual growth rate (CAGR) of 14.8 %. The revenue will grow from \$16.2B in 2001 to \$28.1B in 2005.

### **Key Technologies and Services for Deploying “Bullet Proof” Systems**

Highly available systems need to be able to continuously run critical applications. This implies that backup, maintenance and upgrades must be done without bringing the application down.

Some of the key technologies and services necessary are:

- Applications designed for high availability
- An ultra-reliable, high performance and modular midrange or high end SMP system with lots of redundancy

- Very Large Memory(VLM) capability
- Hardware and software system partitioning features
- High end clustering technology (large number of computer nodes, high performance, long distances, mixed systems/ OS version)
- High performance and high capacity redundant storage with multi-path
- Data Replication software
- Middleware for fault tolerant transaction routing
- Disaster Resilience technology
- Redundant networks
- Systems management tools
- Highly skilled IT staff
- Security (user authentication, secure transactions, intrusion detection)
- Environment (power, cooling)
- Service Processors with remote diagnostics capability
- Professional Services for pre-planning and installation
- “Platinum” worldwide service with onsite spares and service engineers.

### Compaq: Do they have the “right stuff” for Continuous Availability?

HRG strongly believes that OpenVMS based Alpha systems can be deployed for building scalable systems with 99.99 to 100% availability. In fact, Compaq already has many customer installations that achieve this high level of application uptime.

Compaq’s key products and services for building highly available systems are:

- GS320/GS160/GS80: 32 way, 64 bit Alpha CPUs, 1.01GHz, 256GB memory, up to eight hardware partitions on Quad Building Block (QBB) boundaries. Each QBB has 4 CPUs and up to 32GB of memory. Mixed OpenVMS, Tru64 Unix and Linux are supported on hardware partitions. A hardware partition can have 1-8 QBBs.
- OpenVMS and Clusters: a cluster-wide file system, high performance distributed lock manager, high performance shared-disk cluster technology with high performance cluster interconnects (shared memory, memory channel, gigabit Ethernet, ATM). OpenVMS supports 96 node clusters. Wide area clusters are also supported.
- Galaxy: a key technology that allows soft partitions within a hardware partition. Each soft partition can run an independent OpenVMS instance. OpenVMS instances can be modified dynamically under software control. Resources (CPU, memory) can be redeployed from one instance to another. OpenVMS instances within a Galaxy can be clustered using high performance shared memory communications. A Galaxy OpenVMS instance can be clustered with another Alpha/OpenVMS node.
- OpenVMS Volume Shadowing: data-replication software that allows multiple geographically distributed shadow sets. This is a key technology for disaster tolerance and online backup.
- Switched, redundant-path Fibre Channel Storage with multi-path support for high performance Storageworks RAID subsystems.

- Reliable Transaction Router, 4.0: the fault tolerant transactional messaging middleware necessary for 100% application uptime.
- OpenVMS security: Kerberos v5 and cluster-wide intrusion detection.
- Professional Services for planning and deploying complex systems.
- Compaq Global Services: can provide on site services with 30minute response times. Compaq's service capability is second only to IBM's in the industry.

Compaq is so confident of their capability in deploying systems with 99.999% uptime that they will provide a written guarantee on request.

### **OpenVMS: Customer Satisfaction Survey**

Starting well before the acquisition of Digital by Compaq, HRG has tracked the satisfaction and needs of the OpenVMS community. From Digital to Compaq the loyalty of OpenVMS customers has not wavered significantly. Their needs have not changed much since we first spoke with them prior to Compaq's assimilation of Digital.

In the June 2001 survey, Harvard Research Group interviewed 275 IT professionals who manage their companies' OpenVMS servers and clusters. All interviews were conducted randomly and comprise a mix of industries, and geographies (38 states and 6 countries). The top industries represented are: manufacturing (28%); health care (16%); government (13%); education (13%); financial services (11%); telecommunications (4%); and other (15%).

### **OpenVMS Customer Loyalty**

The latest study found that the majority of OpenVMS customers are dedicated to staying with OpenVMS. However, in 1997, 28.3% of IT administrators said that they were going to consider migrating away from the OpenVMS platform. By 2001 this percentage jumped to 36.5%.

### **Migration Away from OpenVMS**

The 36.5% of customers who are considering migration away from OpenVMS cite application availability as their primary reason. The better price/performance of Windows/Intel solutions, the open vs. proprietary operating system issue and the longevity of OpenVMS are also important reasons. Table 1 shows the operating systems being considered by the customers evaluating alternatives to OpenVMS.

**Table 1**  
**Operating System Alternatives to OpenVMS**  
**Among Customers Considering Migration**

	<b>2001*</b>	<b>1997*</b>
Other Compaq OS	10%	17%
Unix (multiple vendors)	33%	48%
Windows NT / 2000	18%	14%
Sun's Solaris	13%	NA
Undecided	22%	NA

\*HRG Customer Satisfaction Surveys: 1997 and June 2001

## Why do the vast majority of customers have no plans to migrate?

HRG, in the June 2001 survey asked respondents, who ran other operating systems in addition to OpenVMS systems, to rate the following:

- a) The selection criteria for all “business critical” servers.
- b) Rate their OpenVMS clusters using the same criteria.

**Table 2**  
**Rating of “Business Critical” Server Selection Criteria and OpenVMS Clusters**

Selection Criteria	“Business Critical” Server Selection Criteria	OpenVMS Clusters
Service and Support	7.17	8.51
Server Availability / Fault Recovery	8.67	8.97
Performance	8.08	8.73
Scalability	5.92	8.92
Total Cost of Ownership	7.74	7.92
Availability of New Applications	8.80	5.69
Price	8.38	7.13
e-Business Readiness	8.74	7.97

Server Criteria Listed by Importance to the Customer (Mean Rating 1= unimportant, 10 = very important)

The data in Table 2 clearly shows that OpenVMS clusters were easily meeting most of the selection criteria for “business critical” servers. OpenVMS clearly satisfied customers in the two most important categories: customer service and server availability. OpenVMS cluster customers rated application availability and price lower than their requirements for “business critical” servers.

### OpenVMS Systems Just Keep On Running

There is no question that Compaq’s OpenVMS Servers are among the most highly available servers in the market. With industry averages for unscheduled downtime running 240 minutes per year, VAX and Alpha Servers average half that number--115 minutes per year! Of the respondents HRG spoke with, 83% experience less than one-hour per month of unscheduled downtime, *while 23% experienced no downtime at all.* In addition, some respondents said that they could not comment on OpenVMS technical support because they have never needed it.

### OpenVMS Systems Require Less Human Resources

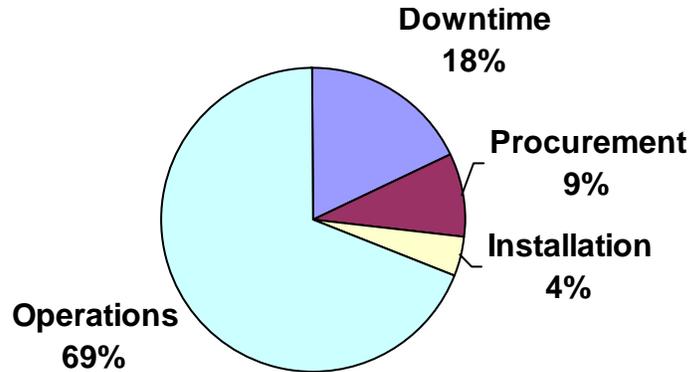
Of those users surveyed, 63% said that fewer people are required to run their OpenVMS servers compared to their non-OpenVMS servers.

### Overall Total Cost of Ownership (TCO) is among the lowest in the industry

A study conducted by HRG in February 2001 focused on the primary factors that contribute to the TCO for servers and clusters. The key contributing factors to TCO are procurement, installation, downtime and operational costs.

The results of our research are shown below.

**Figure1**  
**TCO Cost Breakdown for all Servers and Clusters**



Operational costs are the most significant component of TCO. A system vendor cannot control some of the operational costs (Skilled level of IT personnel, training, overhead).. Compaq’s OpenVMS-based servers are much easier to manage and therefore reduce the TCO by requiring less staff than the competition to keep them up and running.

Downtime is the second most critical factor and accounts for 18% of the total TCO. OpenVMS clustering technology minimizes downtime by allowing for system upgrades and maintenance without bringing the system down. Application failover time is among the fastest in the industry.

The cost of having a critical application “down,” can be considerable. Average losses are estimated to be \$70,000/hour. In financial industries, losses can reach \$1 million or more per hour. These costs can be due to lost sales, lost employee productivity, government penalties and/or a slowdown in manufacturing.

**OpenVMS Customers: Key Issues for Improvement**

Table 3 shows what OpenVMS customers want Compaq to improve. The data is from HRG’s June 2001 survey.

**Table 3**  
**OpenVMS Customers’ Views on what Compaq Needs to Improve**

<b>Feature Needing Improvement</b>	<b>Percent Who Said #1 Issue</b>
Availability of 3 <sup>rd</sup> Party Applications	26%
Marketing	20%
*Customer Service for Sales and Support	20%
Integration With Open Systems	6%
Systems Management Tools	5%
Other (nothing higher than 1%)	23%

\* Still, customers felt that Compaq was better than its competitors in this area.

- **Users want more third party application development.** Application availability is among the top five most issues for customers. This has remained the most significant criticism of OpenVMS for the last five years. The survey showed that Compaq ranked lowest in this category for OpenVMS. Lack of applications is the most cited reason for migration away from OpenVMS to other platforms.
- **Users want more regular communications and upgrades from Compaq.** OpenVMS users have felt under informed about Compaq's strategic plan. They would like product roadmaps to enable them to improve their internal planning. Increased communication would go a long way towards quelling users' concerns.
- **Users want more marketing to prove Compaq's commitment to the future.** Compaq needs to clearly communicate to its installed base that OpenVMS has a long life ahead. Revenues are growing, new customers are migrating to OpenVMS, Compaq is investing significantly in OpenVMS, and ISVs are porting new applications to OpenVMS.
- **Service, service, service! Users want better customer service from sales representatives.** Customers felt that Compaq ranked better than the competitors in this area, but there was a lot of room for improvement. Specific suggestions from customers were as follows:
  - Create a more streamlined sales process that is more focused on solving customer's business needs.
  - Provide Compaq sales representatives with the same expertise as the technical support personnel so customers are able to make purchasing decisions faster and with greater confidence.
  - Include more information and intelligence on the Compaq web site to lighten the load on the sales team and satisfy users' need to get general pricing and technical support.

### **Compaq's Commitment to OpenVMS: 25 Years Is a Likely Scenario.**

In HRG's opinion, OpenVMS has a very good chance of lasting another 25 years. The primary reasons are the following:

- Compaq's decision to move away from Alpha microprocessor development and focus on porting OpenVMS and Tru64 Unix to Intel's Itanium family. The performance gap between Alpha and Itanium was expected to shrink rapidly and would no longer have been a differentiating factor. This will save significant development, manufacturing and support costs. Compaq's midrange and high end Itanium based systems, starting in 2004, will be able to support OpenVMS, Tru64 Unix, Windows and Linux on different partitions. The volume economies of standard high volume Intel servers will be available to customers. This should significantly lower the total cost of ownership for customers.
- Compaq's plan to make OpenVMS compliant with the Defense Information Infrastructure Common Operating Environment (DII COE) standards. Compliance also requires an explicit twenty years of commitment to OpenVMS. OpenVMS based systems have a very good track record in meeting the needs of

the defense establishment. COE certification is expected to be complete by the end of 2001.

- Compaq's well planned installed base migration from Alpha to Itanium systems. Early OpenVMS/Itanium ISV kits are planned for 2002/2003. Customer revenue shipments are planned for 2004. Compaq will also introduce new EV7 based Alpha Systems in late 2002 /early 2003. Customers will be able to buy new Alpha systems until 2008. The four years of overlap between Alpha and Itanium systems will provide customers with a very orderly planned migration.
- Compaq's continuing heavy investment in OpenVMS technology.

### **The Server Consolidation and the eCommerce Opportunity**

Server consolidation is a key market opportunity for OpenVMS. The ability of Compaq to deploy high performance OpenVMS /Alpha systems with guaranteed 99.99 to 99.999% uptimes makes server consolidation a viable option for customers. This will allow customers to significantly upgrade their IT infrastructure in terms of performance, scalability, uptime and manageability, and also achieve a significantly lower TCO. Customers will also be able to safely deploy e-Commerce applications that require almost continuous availability.

OpenVMS customers know that Compaq can deploy systems with high levels of availability. They have had operational systems for years with very little downtime.

Customers will also be able to consolidate OpenVMS and Tru64 Unix systems. This will further guarantee investment protection.

### **Application Availability: The Achilles Heel for OpenVMS**

In order for OpenVMS to get back to its glory days, Compaq has to solve the issue of application availability. Compaq seems to have just enough applications supported on OpenVMS for the Healthcare, Government and Telecommunication sectors.

E-Commerce is an extremely good fit for OpenVMS. The majority of these applications need exactly what OpenVMS can deliver. Compaq must help ensure that the major e-Commerce applications from SAP, Oracle, J.D. Edwards, Siebel, Peoplesoft, I2O, Ariba, Commerce One and other leading edge established and emerging suppliers work on OpenVMS. In addition Compaq needs to have the expertise to help customers deploy e-Commerce solutions.

In the HRG June 2001 survey, 33% of respondents plan to implement e-Business solutions within the next 12 to 18 months. Only 25% of these respondents have any significant knowledge of Compaq's e-Business solutions.

## Conclusions

In HRG's opinion, Compaq has a good chance to significantly grow revenues from OpenVMS based systems in this decade. This conclusion is based on the following:

- OpenVMS based systems currently have all the key technologies necessary to deploy high performance continuous availability systems. Compaq has been extremely successful in deploying OpenVMS clusters for the last 17 years. There are over 50,000 cluster installations--the largest in the industry.
- Compaq has a large Global Services organization.
- The market for high availability systems is large and growing rapidly.
- The e-Commerce market is in its infancy and OpenVMS based systems can easily meet the performance and uptime requirements.
- Compaq has solved the Alpha and OpenVMS longevity issues with the decision to port OpenVMS to Itanium.
- The large 450,000 OpenVMS customer base is loyal.
- Compaq is now generating substantial revenue from new OpenVMS customers.

Compaq needs to significantly increase the supported e-Commerce applications on OpenVMS. Partnering with the leading software vendors in the e-Commerce space is mandatory. Compaq needs to significantly expand its marketing and sales efforts in order to significantly decrease the number of customers who are planning to migrate.

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*Harvard Research Group is an information technology market research and consulting company. The company offers highly focused market research and consulting services to vendors and users of computer hardware, software, and services. For more information contact Harvard Research Group as follows:*

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